

Hawley's
**CONDENSED
CHEMICAL
DICTIONARY**
Eleventh Edition

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Exhibit 2

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Library of Congress Catalog Card Number: 86-23333
ISBN: 0-442-28097-1

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Printed in the United States of America

Van Nostrand Reinhold Company Inc.
115 Fifth Avenue
New York, New York 10003

Van Nostrand Reinhold Company Limited
Molly Millars Lane
Wokingham, Berkshire RG11 2PY, England

Van Nostrand Reinhold
480 Latrobe Street
Melbourne, Victoria 3000, Australia

Macmillan of Canada
Division of Canada Publishing Corporation
164 Commander Boulevard
Agincourt, Ontario M1S 3C7, Canada

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data

Condensed chemical dictionary.
Hawley's condensed chemical dictionary.

Rev. ed. of: The Condensed chemical dictionary.
10th ed./rev. by Gessner G. Hawley, 1981.

I. Chemistry—Dictionaries. I. Hawley, Gessner
Goodrich, 1905— II. Sax, N. Irving (Newton Irving)
III. Lewis, Richard J., Sr. IV. Title.
QD5.C5 1987 540'.3'21 86-23333
ISBN 0-442-28097-1

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hydrolysis. A chemical reaction in which water reacts with another substance to form two or more new substances. This involves ionization of the water molecule as well as splitting of the compound hydrolyzed, e.g., $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{HOH} \rightarrow \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH}$. Examples are conversion of starch to glucose by water in the presence of suitable catalysts; conversion of sucrose (cane sugar) to glucose and fructose by reaction with water in the presence of an enzyme or acid catalyst; conversion of natural fats into fatty acids and glycerol by reaction with water in one process of soap manufacture; and reaction of the ions of a dissolved salt to form various products, such as acids, complex ions, etc.

hydrometer. Device for measuring the density of liquids.
See also Baume'

hydronium ion. An ion (H_3O^+) formed by the transfer of a proton (hydrogen nucleus) from one molecule of water to another, a companion ion (OH^-) is also formed, the reaction is $2\text{HOH} \rightarrow \text{H}_3\text{O}^+ + \text{OH}^-$. Formation of such ions is statistically rare, resulting from the interaction of water molecules in a ratio of 1:556 million.

hydroperoxide. An organic peroxide having the generalized formula ROOH . An example is ethyl hydroperoxide ($\text{C}_2\text{H}_5\text{OOH}$). Methyl and ethyl hydroperoxides are unstable and thus are strong oxidizing agents and explosion hazards; those of higher molecular weight are more stable. Hydroperoxides can be derived by oxidation of saturated hydrocarbons, or by alkylating hydrogen peroxide in a strongly acidic environment. They are used as polymerization initiators.

hydrophilic. Having a strong tendency to bind or absorb water, which results in swelling and formation of reversible gels. This property is characteristic of carbohydrates, such as algin, vegetable gums, pectins and starches, and of complex proteins such as gelatin and collagen.

hydrophobic. Antagonistic to water, incapable of dissolving in water. This property is characteristic of all oils, fats, waxes, and many resins, as well as of finely divided powders like carbon black and magnesium carbonate.

hydroponics. See nutrient solution.

"Hydro-Pruf." TM ⁷³⁰⁰ TM for a silicone water repellent for fabrics. Applied with a catalyst at high curing temperatures.

hydroquinol. See hydroquinone.

hydroquinone. (quinol; hydroquinol; p-dihydroxybenzene). CAS: 123-31-9.
 $\text{C}_6\text{H}_4(\text{OH})_2$.

Properties: White crystals; soluble in water, alcohol, and ether; d 1.330; mp 170C; bp 285C; flash p 329F (165C); autoign temperature 960F (515.5C). Combustible.

Derivation: Aniline is oxidized to quinone by manganese dioxide and is then reduced to hydroquinone.

Grade: Technical, photographic.

Hazard: Toxic by ingestion and inhalation, irritant. TLV: 2 mg/m³ of air.

Use: Photographic developer (except color film); dye intermediate; inhibitor; stabilizer in paints and varnishes, motor fuels, and oils; antioxidant for fats and oils; inhibitor of polymerization.

hydroquinone benzyl ether. See p-benzyloxyphenol.

hydroquinone dibenzyl ether. CAS: 103-16-2.
 $\text{C}_6\text{H}_5\text{CH}_2\text{OC}_6\text{H}_4\text{OCH}_2\text{C}_6\text{H}_5$.

Properties: Tan powder; mp 119C (min); purity 90% (min); insoluble in water; soluble in acetone, benzene, and chlorobenzene. Combustible.

Use: Solvent; perfumes, soap, plastics, and pharmaceuticals.

hydroquinone di-n-butyl ether. (1,4-dibutoxybenzene). $\text{C}_6\text{H}_4[\text{O}(\text{CH}_2)_3\text{CH}_3]_2$.

Properties: White flakes with no appreciable odor; mp 45-46C; bp 124C (1.3 mm), 158C (15.0 mm); insoluble in water; soluble in benzene, acetone, ethyl acetate, and alcohol. Combustible.

hydroquinone diethyl ether. (1,4-diethoxybenzene). $\text{C}_6\text{H}_4(\text{OC}_2\text{H}_5)_2$.

Properties: White granular solid with anise-like odor, mp 71-72C, bp 246C. Neither boiling caustic nor acid solution cause any hydrolysis. Absorbs UV light. Insoluble in water; soluble in benzene, acetone, ethyl acetate, and alcohol. Combustible.

hydroquinone di(β-hydroxyethyl) ether. (p-di-[2-hydroxyethoxy]benzene). $\text{C}_6\text{H}_4(\text{OC}_2\text{H}_4\text{OH})_2$.

Properties: White solid, mp 99C, bp 185-200C (0.3 mm), slightly soluble in water and most organic solvents, miscible with water at 80C. Combustible.

Use: Preparation of polyester, polyolefins, polyurethanes and hard waxy resins, organic synthesis.

hydroquinone dimethyl ether. (1,4-dimethoxybenzene; DMB; dimethyl hydroquinone). CAS: 654-42-2. $\text{C}_6\text{H}_4(\text{OCH}_3)_2$.

Properties: White flakes with sweet clover odor, bp 213C, mp 56C, d 1.0293 (65C), viscosity 1.04

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